RAP Energy solutions for a changing world

Motivating and Measuring Demand Response

Roadmap to Implementing Michigan's New Energy Policy

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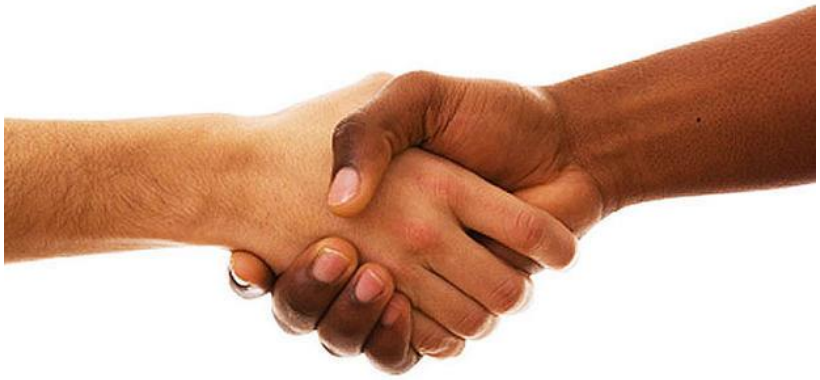
Introducing RAP and Rich

- RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP staff have extensive utility regulatory experience. RAP technical assistance to states is supported by US DOE, US EPA and foundations.
  - Richard Sedano directs RAP's US Program. He was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.

Motivating a Market (Voluntary) Response to Demand Response

- Programs that motivate customers
- Regulation that motivates utilities



Active Customers make a market work

Regulation Status Quo

- Not much systemic attention to DR
- Peak can be addressed by engineered solutions
  - Capital investments
  - Are there cheaper ways? Is this question asked?
- A peak crisis draws attention when strategic response is not timely
  - Brute force, the familiar, generally result

Regulatory Design

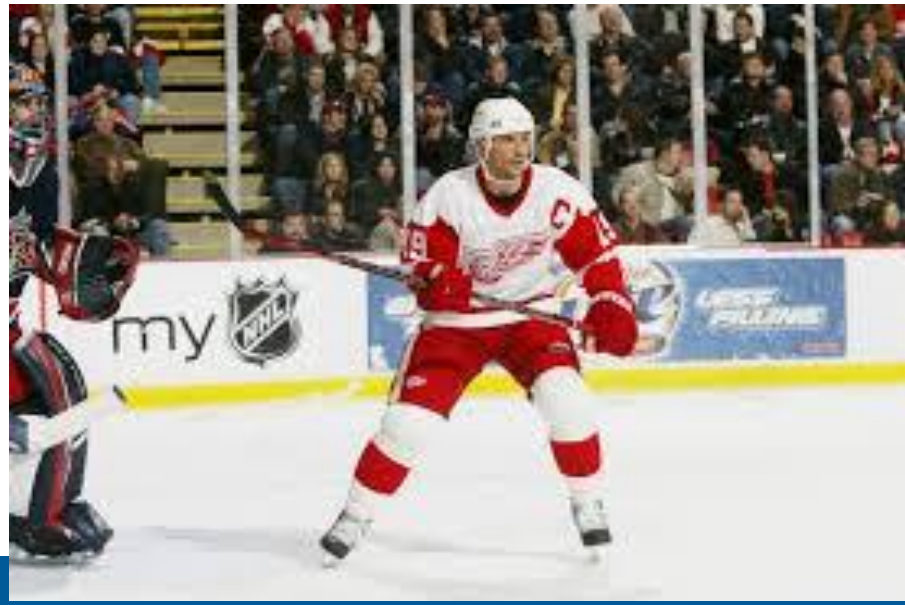
- Mandates
  - Demand response performance standard
    - X MW (or x% of peak load) of DR required in a given year
    - Motivates DR for purpose of compliance
    - As in Arizona; PA has also had a DR mandate
  - Can also have a storage resource standard

Regulatory Design

- Rely on the RTO
  - Only wholesale value is monetized
    - Legal uncertainty over FERC jurisdiction
  - State/Service Area values not monetized
    - Unique Local Programmatic Features overlooked

Moving Where the Puck Will Be

- Michigan is deploying AMI technology and other systems that will improve the capability of demand response programs



Regulatory Design

- Performance (because it's important)
  - Key indicators
    - Manageable, a report card
  - Upside (asymmetric)
  - Exemplary trigger can bring in a reward

Reward represents incremental value to the system and its users

Measuring Performance

- Common performance metrics
  - Quantity (MW) (MW during peak season)
  - Participation (customers)
  - Avoided capital costs
  - System efficiency
  - Other utility measures influenced by DR
- Best metrics are counted ministerially
  - Not argued over or subject to many interpretations
  - Avoid confounding metrics
  - Avoid gaming (distorting the baseline)

Utilities may already track key metrics for their own purposes

A return on DR investment - options

- Performance bonus for achieving exemplary threshold result
  - Shared saving also possible (measurement issue)
- Capital related DR costs earn a higher return
- DR Expenses become Reg assets –
  - Book and defer costs, earn on unamortized balance, for x years
- Cost inputs can have triggers activated by performance so they are not just rewarding spending

Program Design

- Cost effectiveness of DR
  - UCT (utility system focus)
    - What costs? What benefits? (time frame, location)
  - PCT (customer focus)
    - How to get the customer to bite
- Program design depends on ability to
  - Monetize DR benefits
  - Get a "yes" from the customer
    - Manage customer concern about curtailment

Automation a key to success

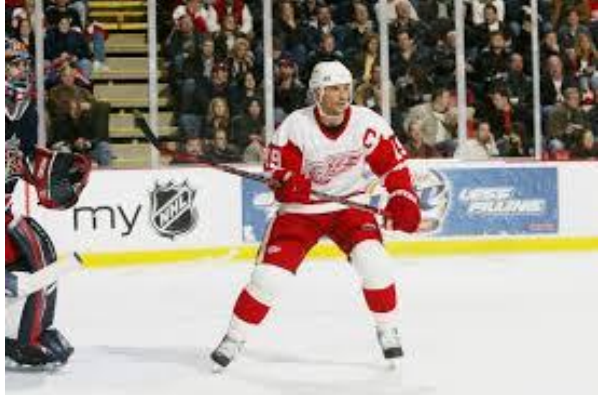
Program Design

- As challenging a process for DR as for EE
  - Motivating customers
  - Know the market
    - Mid-stream program opportunities
  - Participation incentives are just part of the transaction
    - Customers are paid to curtail, and evaluate its worth as a population
    - Utility is faced with a supply curve of demand response resources with more available the more it is willing to pay, willingness to pay is based on producing **system value**
      - Shared among participants, all customers, the utility if there is a reward, and any third parties involved

Other Demand Response Challenges

- What is the counter-factual?
  - Customer Baseline AND Utility Baseline
  - For customers – AMI a tool for the job
  - For the utility – data in load, capital forecasts (10 yr minimum), IRP, **distribution plans**, operating procedures, other sources
    - Confidence in these data sources?
- Rate Design: Peak time rebate as DR?
- Credibility: Does DR REALLY save capital $$?
- Emissions: Limit uncontrolled Back up Generators

Advanced Issues



- Electric Cars on DR programs
  - Anything addressable and controllable
- Data analytics using meter data management for program design and marketing
  - **Update** programs, metrics, purpose, everything
- 24x7x365 demand response
  - For operating a system with increased wind and solar
    - Ramping and cycling
- Ultimately about grid value: reduced cost, increased performance from customer action

Reasonable roles for this group

- Priorities
- Principles
- Early Year Directions
  - to regulators & utilities
- Illustrate these
- Don't be program design experts
  - Consider program manageability

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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